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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,729	04/09/2004	Anders Landin	5681-13301	1516
58467 MHKKG/SUN P.O. BOX 398 AUSTIN, TX 78767	7590 12/18/2007		EXAMINER VERDERAMO III, RALPH	
			ART UNIT 2186	PAPER NUMBER
			MAIL DATE 12/18/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,729	LANDIN ET AL.	
	Examiner	Art Unit	
	Ralph A. Verderamo III	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 October 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-42 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-42 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>7/11/2007</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 9, 12 – 23, 26 – 36 and 39 – 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Hunter et al. US Patent No. 5394555 (herein after referred to as Hunter).

Regarding claims 1, 16 and 28, Hunter discloses a system, comprising: an inter-node network (Internode ECU bus, column 4, line 18 and internode ECU bus 11 of FIG. 2); and a plurality of nodes (2 nodes represented in FIG. 2 also described in column 4, lines 10 – 12) coupled by the inter-node network, wherein each of the plurality of nodes includes a plurality of active devices (2 CPUs represented in FIG. 2 also described in column 4, lines 10 – 12), an interface configured to send and receive coherency messages on the inter-node network (ECU 10 of FIG. 2 and column 4, lines 13 – 18), and an address network coupling the plurality of active devices to the interface (node local bus 4 of FIG. 2 and column 4, line 14); wherein an active device included in a node of the plurality of nodes is configured to initiate a write back transaction involving a coherency unit by sending either a first type of address packet or a second type of address packet on the address network dependent on whether the active

device is included in a multi-node system (Since commands snooped from ECU bus 11, which originated from other nodes, must be translated for the local node the commands (address packets) used globally and locally must be different and used based on where the command is going (column 4, lines 21 – 25)).

Regarding claims 2, 17, and 29, Hunter discloses the system of claim 1 (see above), the node of claim 16 (see above) and the method of claim 28 (see above), wherein the first type of address packet is a remote write back (RWB) address packet and the second type of address packet is a write back (WB) address packet (A modified shared page that has not been referenced for some time can be evicted by signaling its home node to write it to disk (column 7, lines 21 – 24). As described above (and further below in response to arguments) since commands snooped from the ECU bus, which originated from other nodes, must be translated for the local node the commands used globally and locally must be different and used based on where the command is going (column 4, lines 21 – 25)), wherein the active device is configured to send the RWB address packet if the active device is included in a multi-node system, and wherein each active device included in the node having access to or ownership of the coherency unit is configured to ignore the RWB address packet (If a CPU wishes to obtain an exclusive copy of a shared cache-line it places a suitable command on its node-local bus (column 6, lines 21 – 26). In the further described steps the other CPUs included in the local node do not take any action (column 6, lines 27 – 45)); wherein each active device included in the node having access to or

ownership of the coherency unit is configured to transition an access right to or an ownership responsibility for the coherency unit in response to the second type of address packet (If a node contains the cache-line in a modified state (ownership) it is siphoned to the requesting node and invalidated in the originating node. The cache line is then owned exclusively and can be updated (column 4, lines 33 – 48)).

Regarding claims 3, 18, and 30, Hunter discloses the system of claim 2 (see above), the node of claim 17 (see above) and the method of claim 29 (see above), wherein the active device is configured to send the RWB address packet if the active device is included in a multi-node system and if the coherency unit is not mapped by any memory subsystem included in the node (A modified shared page that has not been referenced for some time can be evicted by signaling its home node to write it to disk (column 7, lines 21 – 24)).

Regarding claims 4, 19, and 31, Hunter discloses the system of claim 3 (see above), the node of claim 18 (see above) and the method of claim 30 (see above), wherein an interface included in the node is configured to send a coherency message via the inter-node network to a home node for the coherency unit in response to receiving the remote write back address packet, and wherein each active device included in the node is configured to ignore the remote write back address packet (The coherency states of cache-lines in remote nodes may be left intact, which one would conclude to mean that they are ignoring that particular command (column 7, lines 28 – 29)).

Regarding claims 5 and 32, Hunter discloses the system of claim 4 (see above) and the method of claim 31 (see above), wherein a home interface in the home node is configured to lock the coherency unit in response to the coherency message and to responsively send an additional coherency message requesting initiation of a proxy read-to-own-modified subtransaction to the interface in the node (When an exclusive copy of a cache-line is required a RTW or "read with intent to write" (read to own modified) command is sent (column 6, lines 21 – 52)).

Regarding claims 6, 20, and 33, Hunter discloses the system of claim 5 (see above), the node of claim 19 (see above) and the method of claim 32 (see above), wherein in response to receiving the additional coherency message, the interface in the node is configured to send a proxy read-to-own-modified address packet on the address network (column 6, lines 21 – 52).

Regarding claims 7, 21, and 34, Hunter discloses the system of claim 6 (see above), the node of claim 20 (see above) and the method of claim 33 (see above), wherein each active device included in the node having an access right to the coherency unit and not having an ownership responsibility for the coherency unit is configured to invalidate the access right in response to the proxy read-to-own modified address packet (INV command is sent to other nodes, which cause them to set their states to invalid (column 6, lines 31 – 40 as well as lines 41 – 45).

Regarding claims 8, 22, and 35, Hunter discloses the system of claim 6 (see above), the node of claim 20 (see above) and the method of claim 33 (see above), wherein the active device is configured to transition an ownership responsibility for the coherency unit upon receipt of the proxy read-to-own modified address packet and to responsively send a data packet corresponding to the coherency unit to the interface (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40). As explained in column 6, lines 21 – 26, this step is part of a request for an exclusive copy (ownership) which sends an RTW or “read with intent to write” command (read to own modified)).

Regarding claims 9, 23, and 36, Hunter discloses the system of claim 8 (see above), the node of claim 22 (see above) and the method of claim 35 (see above), wherein the active device is configured to transition an access right corresponding to the coherency unit upon sending the data packet (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40). As explained in column 6, lines 21 – 26, this step is part of a request for an exclusive copy (ownership) which sends an RTW or “read with intent to write” command (read to own modified)).

Regarding claims 12, 26, and 39, Hunter discloses the system of claim 1 (see above), the node of claim 16 (see above) and the method of claim 28 (see above), wherein the first type of address packet is a remote write stream address

packet (RWS) and the second type of address packet is a write stream address packet (WS), wherein the active device is configured to send the RWS address packet if the active device is included in a multi-node system and to send the WS address packet if the active device is included in a single node system (From the specification a remote write stream command retrieves a copy of data while allowing the owning node to keep its copy. This is similar to a shared cache line state (column 6, line 14)).

Regarding claims 13, 27, and 40, Hunter discloses the system of claim 12 (see above), the node of claim 26 (see above) and the method of claim 39 (see above), wherein an interface included in the node is configured to respond to the first type of address packet by sending a coherency message via the inter-node network to a home node for the coherency unit, and wherein active devices and memory subsystems included in the node are configured to ignore the first type of address packet (The coherency states of cache-lines in remote nodes may be left intact, which one would conclude to mean that they are ignoring that particular command (column 7, lines 28 – 29)).

Regarding claims 14 and 41, Hunter discloses the system of claim 13 (see above) and the method of claim 40 (see above), wherein in response to the coherency message, a home interface included in the home node is configured to lock the coherency unit and to responsively send an invalidating coherency message to one or more ones of the plurality of nodes and to send a write stream coherency message to the interface in the node (When an exclusive copy of a

cache-line is required a RTW or “read with intent to write” (read to own modified) command is sent (column 6, lines 21 – 52). INV command is sent to other nodes, which cause them to set their states to invalid (column 6, lines 31 – 40 as well as lines 41 – 45)).

Regarding claims 15 and 42, Hunter discloses the system of claim 14 (see above) and the method of claim 41 (see above), wherein the interface in the node is configured to send a pull request data packet to the active device in response to receiving acknowledgment coherency messages from each of the one or more ones of the plurality of nodes that received the invalidating coherency message; wherein in response to the pull request data packet, the active device is configured to send an additional data packet containing a copy of the coherency unit to the interface (A remote node that contains the line in exclusive or modified state will transmit the cache line over the inter-node bus to the requestor (column 6, lines 31 – 40)).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 10, 24 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter in view of Farmwald et al. US Patent No. 5606717 (herein after referred to as Farmwald).

Regarding claims 10, 24 and 37, Hunter discloses the owner of a node providing data about a coherency unit (column 6, lines 31 – 40). Hunter does not disclose the use of a NACK data packet.

Farmwald, which describes a bus interface for receiving information in packets, describes the use of a NACK (column 13, line 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include the use of a NACK packet as described in Farmwald with the system of Hunter because NACKs are well known and conventional in the art.

6. Claims 11, 25 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter in view of Baxter et al. US Patent No. 5887146 (herein after referred to as Baxter) and Martin et al. "Bandwidth Adaptive Snooping" (herein after referred to as Martin).

Regarding claims 11, 25 and 38, Hunter discloses the system of claim 1 (see above), the node of claim 16 (see above) and the method of claim 28 (see above) but does not disclose the use of a mode register.

Martin, which describes snoop protocols, discloses the use of a counter to determine how many nodes are being used in the system (Martin Page 2).

Baxter, which describes a multi-node system, discloses the use of a mode register (Baxter, column 47, line 66).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include a mode register to determine if the node is in a multi-node system because it is important to know the network utilization (Martin Page 2) and mode registers are well known and conventional in the art.

Response to Arguments

Applicant argues that only one type of command is being sent. Examiner refers to column 6, lines 12 – 20 and column 4, lines 21 – 25. Column 6, lines 12 – 20 describes determining if inter-node action is required and translating the physical address appropriately. Column 4, lines 21 - 25 describes translating inter-node commands into their own physical tags and injected into their own node-local bus. These show inter-node and intra-node communications being translated in order to be used in each network (inter-node translated to intra-node and intra-node translated to inter-node).

Applicant argues that a different command dependent upon whether the cache line is present in another node not whether there is another node present.

Examiner refers to column 6, lines 12 – 20. ECU determines if inter-node action is required. If the system were not in a multi-node system it would determine that inter-node action is not required.

Applicant argues that Hunter in view of Farmwald does not teach the limitations of claim 10. Examiner refers to column 6, lines 21 – 40. If the state is invalid (meaning other copies exist) an RTW command is transmitted over the inter-node network. A remote node that contains the line in exclusive or modified state (currently owns the cache line) will transmit the cache line over the inter-node ECU bus to the requester (providing data to requesting device). Farmwald is used to teach that NACKs can be used during bus transfers.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ralph A. Verderamo III whose telephone number is (571) 270-1174. The examiner can normally be reached on M-Th 7:30 - 5, every other Friday 7:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Ralph A. Verderamo III
Examiner
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rv
December 12, 2007

spt
12/14/07


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